

WHAT IS CLAIMED IS:

1. A method for manufacturing a GaN compound semiconductor element, comprising the steps of:

5 (a) forming, on a substrate, an N type GaN compound semiconductor layer and a GaN compound semiconductor layer which includes a P type impurity; and

(b) irradiating electromagnetic radiation of a predetermined wavelength onto said GaN compound semiconductor layer which includes
10 a P type impurity.

2. A method according to claim 1, wherein said electromagnetic radiation of a predetermined wavelength is electromagnetic radiation having a wavelength that is selectively absorbed by the bonded
15 structure of said P type impurity and H.

3. A method according to claim 1, wherein said step (b) is performed while heating the substrate.

20 4. A method according to claim 1, wherein said step (a) includes the steps of:

(a1) forming a buffer layer on said substrate;

(a2) forming an N type GaN compound semiconductor layer on said buffer layer; and

25 (a3) forming said GaN compound semiconductor layer which includes a P type impurity on said N type GaN compound semiconductor layer.

5. A method according to claim 1, wherein said step (a) includes

the steps of:

(a1) forming a buffer layer on said substrate;

(a2) forming said GaN compound semiconductor layer which includes a P type impurity on said buffer layer; and

5 (a3) forming said N type GaN compound semiconductor layer on said GaN compound semiconductor layer which includes a P type impurity.

6. A method according to claim 1, wherein said P type impurity is at least one of Mg, Zn, Cd, Be, and Ca.

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15 7. A method according to claim 1, wherein light having a wavelength of 4.5 μm is irradiated with an intensity of 0.01 mW/mm² or greater at said step (b).

8. A method according to claim 1, wherein electromagnetic radiation having a frequency of 2.45 GHz is irradiated at an intensity of 1 mW/cm² or greater at said step (b).

20 9. A method according to claim 1, wherein said N type GaN compound semiconductor layer is formed by doping an N type impurity to a GaN compound semiconductor.

10. A GaN compound semiconductor element comprising:

25 a substrate;

an N type GaN compound semiconductor layer formed on said substrate;

a P type GaN compound semiconductor layer formed on said substrate and adjacent to said N type GaN compound semiconductor

layer; wherein

said P type GaN compound semiconductor layer is formed by irradiating electromagnetic radiation of a predetermined wavelength onto a GaN compound semiconductor layer to which a P type impurity
5 is doped.

11. An element according to claim 10, wherein said electromagnetic radiation of a predetermined wavelength is electromagnetic radiation having a wavelength that is selectively absorbed by the bonded
10 structure of said P type impurity and H.

12. An element according to claim 11, wherein said electromagnetic radiation of a predetermined wavelength is light having a wavelength of 4.5 μm .
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13. An element according to claim 11, wherein said electromagnetic radiation of a predetermined wavelength is electromagnetic radiation having a frequency of 2.45 GHz.

14. An element according to claim 10, wherein said P type GaN compound semiconductor layer is formed by irradiating said electromagnetic radiation of a predetermined wavelength while heating the GaN compound semiconductor layer to which the P type impurity is doped.
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